

WHAT IS CLAIMED IS:

1 b1 1. A process for sealing and insulating a fuel cell plate, the process comprising:
2 providing a fuel cell plate having first and second surfaces;
3 427 3 applying a coating precursor on at least the first surface of the fuel cell plate, the
4 coating precursor adapted to polymerize in response to radiation or heat; and
5 exposing the coating precursor on the fuel cell plate to radiation or heat to initiate
6 polymerization.

1 2. The process of claim 1, wherein the coating precursor is applied by screen
2 printing.

1 3. The process of claim 1, wherein the coating precursor is exposed to ultraviolet
2 radiation.

1 4. The process of claim 3, wherein the coating precursor is successively exposed
2 to ultraviolet radiation of at least two different wavelengths.

1 5. The process of claim 1, wherein the coating precursor is exposed to infrared
2 radiation.

1 6. The process of claim 1, wherein the coating precursor is adapted to polymerize
2 in response to ultraviolet radiation.

1 7. The process of claim 1, wherein the coating precursor is adapted to polymerize
2 in response to electron beam radiation.

1 8. The process of claim 1, wherein the coating precursor is adapted to polymerize
2 in response to infrared radiation.

1 9. The process of claim 1, wherein the coating precursor is exposed to radiation
2 for about less than about 45 minutes.

1 10. The process of claim 1, wherein the coating precursor is exposed to radiation
2 for about less than about one minute.

1 11. The process of claim 1, wherein the coating precursor is exposed to radiation
2 for about less than about 30 seconds.

1 12. The process of claim 1, wherein the coating precursor is exposed to radiation
2 for about less than about 15 seconds.

1 13. The process of claim 1, wherein the coating precursor is exposed to radiation
2 for about less than about 5 seconds.

1 14. The process of claim 1, wherein the coating precursor is an ultraviolet-curable
2 coating precursor.

1 15. The process of claim 1, wherein the coating precursor is an electron beam-
2 curable coating precursor.

1 16. The process of claim 1, wherein the coating precursor is an infrared-curable
2 coating precursor.

1 17. A process for sealing and insulating a fuel cell plate, the process comprising:
2 providing a fuel cell plate having first and second surfaces;
3 applying a coating precursor on at least the first surface of the fuel cell plate, the
4 coating precursor adapted to polymerize in response to ultraviolet radiation; and
5 exposing the coating precursor on the fuel cell plate to ultraviolet radiation to initiate
6 polymerization, wherein the coating precursor includes an acrylated oligomer and a
7 photoinitiator.

1 18. The process of claim 17, wherein the coating precursor further includes a
2 mono-functional monomer for reducing viscosity.

1 19. The process of claim 17, wherein the coating precursor further includes a
2 multi-functional monomer for increasing cross-link density.

1 20. The process of claim 17, wherein the coating precursor further includes a
2 adhesion promoter.

1 21. The process of claim 17, wherein the coating precursor further includes an air-
2 release agent.

1 22. An insulated fuel cell plate comprising:
2 a plate having first and second surfaces; and
3 a coating precursor applied on at least one of the first and second surfaces of the plate,
4 the coating precursor adapted to polymerize in response to radiation or heat.

1 23. The insulated fuel cell plate of claim 22, wherein the coating precursor is less
2 than about 250 μ thick.

1 24. The insulated fuel cell plate of claim 22, wherein the coating precursor is less
2 than about 150 μ thick.

1 25. The insulated fuel cell plate of claim 22, wherein the coating precursor is
2 adapted to polymerize in response to ultraviolet radiation.

1 26. The insulated fuel cell plate of claim 22, wherein the coating precursor is
2 adapted to polymerize in response to electron beam radiation.

1 27. The insulated fuel cell plate of claim 22, wherein the coating precursor is
2 adapted to polymerize in response to infrared radiation.

1 28. The insulated fuel cell plate of claim 22, wherein the coating precursor is
2 substantially polymerized after exposure to radiation for about less than about 45 minutes.

1 29. The insulated fuel cell plate of claim 22, wherein the coating precursor is
2 substantially polymerized after exposure to radiation for about less than about one minute.

1 30. The insulated fuel cell plate of claim 22, wherein the coating precursor is
2 substantially polymerized after exposure to radiation for about less than about 30 seconds.

1 31. The insulated fuel cell plate of claim 22, wherein the coating precursor is
2 substantially polymerized after exposure to radiation for about less than about 15 seconds.

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1 32. The insulated fuel cell plate of claim 22, wherein the coating precursor is
2 substantially polymerized after exposure to radiation for about less than about 5 seconds.

1 33. An insulated fuel cell plate comprising:
2 a plate having first and second surfaces; and
3 a coating precursor applied on at least one of the first and second surfaces of the plate,
4 wherein the coating precursor is an acrylate resin, an epoxy nitrile resin, or an
5 organopolysiloxane, either alone or in combination.

1 34. The insulated fuel cell plate of claim 33, wherein the coating precursor
2 includes an acrylated urethane oligomer and a photoinitiator.

1 35. The insulated fuel cell plate of claim 34, wherein the coating precursor further
2 includes a mono-functional monomer for reducing viscosity.

1 36. The insulated fuel cell plate of claim 34, wherein the coating precursor further
2 includes a multi-functional monomer for increasing cross-link density.

1 37. The insulated fuel cell plate of claim 34, wherein the coating precursor further
2 includes an adhesion promoter.

1 38. The insulated fuel cell plate of claim 34, wherein the coating precursor further
2 includes an air-release agent.

1 39. An insulated fuel cell plate comprising:
2 a plate having first and second surfaces; and
3 a coating precursor applied on at least one of the first and second surfaces of the plate,
4 the coating precursor comprising:
5 an acrylated aliphatic urethane oligomer;
6 an acrylated epoxy oligomer;
7 a mono-functional monomer for reducing viscosity of the coating precursor;
8 a multi-functional monomer for increasing cross-link density;
9 an adhesion promoter; and
10 a photoinitiator.

1 40. The insulated fuel cell plate of claim 39, wherein the mono-functional
2 monomer is isobornyl acrylate monomer.

1 41. The insulated fuel cell plate of claim 39, wherein the adhesion promoter is a
2 methacrylated polyol.

1 42. The insulated fuel cell plate of claim 39, wherein the multi-functional
2 monomer is propoxylated glycerol triacrylate monomer.

1 43. The insulated fuel cell plate of claim 39, wherein the photoinitiator is a blend
2 of 1-phenyl-2-hydroxy-2-methyl-1-propanone and benzophenone.

1 44. The insulated fuel cell plate of claim 39, wherein the coating precursor further
2 comprises an air-release agent.

1 45. The insulated fuel cell plate of claim 44, wherein the air-release agent is a
2 polydimethyl siloxane.

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- 1 46. An ultraviolet radiation-curable coating precursor comprising:
2 an acrylated aliphatic urethane oligomer;
3 an acrylated epoxy oligomer;
4 a mono-functional monomer for reducing viscosity of the coating precursor;
5 a multi-functional monomer for increasing cross-link density;
6 an adhesion promoter; and
7 a photoinitiator.
- 1 47. The ultraviolet radiation-curable coating precursor of claim 46, wherein the
2 mono-functional monomer is isobornyl acrylate monomer.
- 1 48. The ultraviolet radiation-curable coating precursor of claim 46, wherein the
2 adhesion promoter is a methacrylated polyol.
- 1 49. The ultraviolet radiation-curable coating precursor of claim 46, wherein the
2 multi-functional monomer is propoxylated glycerol triacrylate monomer.
- 1 50. The ultraviolet radiation-curable coating precursor of claim 46, wherein the
2 photoinitiator is a blend of 1-phenyl-2-hydroxy-2-methyl-1-propanone and benzophenone.
- 1 51. The ultraviolet radiation-curable coating precursor of claim 46, wherein the
2 coating precursor further comprises an air-release agent.
- 1 52. The ultraviolet radiation-curable coating precursor of claim 51, wherein the
2 air-release agent is a polydimethyl siloxane.

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53. An ultraviolet radiation-curable coating precursor comprising:
from about 25 wt. % to about 65 wt. % of an acrylated aliphatic urethane oligomer;
from about 5 wt. % to about 20 wt. % of an acrylated epoxy oligomer;
from about 20 wt. % to about 40 wt. % of a mono-functional monomer for reducing
viscosity of the coating precursor;
from about 1 wt. % to about 5 wt. % of a multi-functional monomer for increasing
cross-link density;
from about 1 wt. % to about 15 wt. % of an adhesion promoter; and
from about 0.1 wt. % to about 10 wt. % of a photoinitiator.

54. The ultraviolet radiation-curable coating precursor of claim 53, wherein the
mono-functional monomer is isobornyl acrylate monomer.

55. The ultraviolet radiation-curable coating precursor of claim 53, wherein the
adhesion promoter is a methacrylated polyol.

56. The ultraviolet radiation-curable coating precursor of claim 53, wherein the
multi-functional monomer is propoxylated glycerol triacrylate monomer.

57. The ultraviolet radiation-curable coating precursor of claim 53, wherein the
photoinitiator is a blend of 1-phenyl-2-hydroxy-2-methyl-1-propanone and benzophenone.

58. The ultraviolet radiation-curable coating precursor of claim 53, wherein the
coating precursor further comprises an air-release agent.

59. The ultraviolet radiation-curable coating precursor of claim 58, wherein the
air-release agent is a polydimethyl siloxane.

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